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ComEd

January 21, 1997

JSPLTR: 97-0009

U. S. Nuclear Regulatory Commission
Attn. Document Control Desk
Washington, D. C. 20555

SUBJECT: Dresden Station Units 2 and 3
Quad Cities Station Units 1 and 2
ComEd Response to NRC Request For Additional Information: P-T Curves
NRC Docket Nos. 50-237/249 and 50-254/265

REFERENCES: (a) J. F. Stang letter to I. Johnson, Request For Additional Information, dated December 9, 1996.

(b) P. L. Piet letter to USNRC, Changes to Pressure - Temperature (P - T) Curves, dated September 20, 1996.

The purpose of this letter is to provide ComEd's response to the Reference (a) Request For Additional Information (RAI) regarding Pressure - Temperature (P - T) Curves at Dresden and Quad Cities Stations. In the Reference (b) submittal, ComEd requested the NRC Staff to approve a license amendment which would extend the current P- T Curves from 16 to 22 effective full power years (EFPYs) for both Dresden and Quad Cities. Attached is ComEd's response to the Reference (a) RAI. Several key points are summarized below:

- Since the available electroslag weld data is not specific to the heats of weld wire contained in the Dresden and Quad Cities reactor vessels, the electroslag weld data will be treated as generic, and a conservative estimate of electroslag weld chemistry will be performed consistent with Regulatory Guide 1.99, Revision 2.

- As a result, the adjusted reference temperature of some individual vessel materials will increase; however, the P-T Curves proposed in Reference (b), which are based on the most limiting material of the four vessels, are not affected.

- A revision to the supporting analysis (GE-NE-B11-00707-01R1, *Pressure Temperature Curves for Dresden and Quad Cities Stations*, July 1996) reflecting the revised electroslag weld data and other enhancements as described in the Attachment, will be provided by April 18, 1997.

A001

Please refer any questions you may have to this office.

Sincerely,

J. Stephen Perry
Site Vice President
Dresden Station

Attachment: ComEd Response to NRC Request For Additional Information - Proposed Amendment Associated With Pressure Temperature Curves

cc: A. B. Beach, Regional Administrator - RIII
C. L. Vanderniet, Senior Resident Inspector - Dresden
C. G. Miller, Senior Resident Inspector - Quad Cities
J. F. Stang, Project Manager - NRR
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ComEd Response to NRC Request For Additional Information
Proposed Amendment Associated With Pressure Temperature Curves

1) By teleconference conducted on November 26, 1996, the licensee indicated that there was no traceability of beltline welds fabricated using the electroslag process to specific weld wire heat numbers. The electroslag welds in the Dresden, Units 2 and 3, and Quad Cities, Units 1 and 2, beltlines are identified in the submittal dated September 20, 1996. For all beltline welds fabricated using the electroslag welding process, identify the weld wire heat numbers and "PQ" numbers that could have been used to fabricate the welds.

The attachment to this response titled "Table 6. D 2/3 and QC 1/2 Electroslag Weld Wire Heat and Flux Lot Numbers" provides a listing of the weld wire heat numbers and the "PQ" numbers that could have been used to fabricate the welds. Table 6 was previously provided in Attachment B to the letter from M.A. Jackson (ComEd) to T.E. Murley (USNRC), Subject: Dresden Station Units 2 and 3; Quad Cities Station Units 1 and 2; LaSalle County Station Units 1 and 2, July 1992. Two typos have been corrected as noted on the attached Table 6, based on a review performed of the underlying GE Weld Materials Traceability Summary for the Dresden Station Units 2 and 3 and Quad Cities Units 1 and 2 reactor vessels for the purpose of this response.

2) Provide the best-estimate percent copper for the beltline welds fabricated using the electroslag process using one of the following methods (per 10 CFR 50.61,(c)(1)(iv)(A)):

   a) The best estimate is the mean of the measured values for a weld deposit made using the same weld wire heat number as the critical vessel weld,

   b) If these values are not available, upper limiting values given in the materials specification to which the vessel material was fabricated may be used,

   c) If not available, conservative estimates (mean plus one standard deviation based on generic data) may be used if justification is provided,

   d) If none of the above are available, 0.35% copper and 1.00% nickel may be used.

For the September 20, 1996 submittal, ComEd had considered the electroslag welds in the Dresden Units 2 and 3 and Quad Cities Units 1 and 2 reactor vessels to be part of a unique, limited population (or class) of welds. The mean of the measured values of copper from all known electroslag procedure qualification

weld chemistry data and surveillance weld chemistry data was used to determine the best estimate value of copper in accordance with Regulatory Guide 1.99 Revision 2 Section 1.1.
Based on recent consultations with industry experts involved with the industry effort to evaluate weld chemistry variability, ComEd has re-evaluated this position. Since the available electroslag weld data is not specific to the heats of weld wire contained in the Dresden and Quad Cities reactor vessels, the electroslag weld data will be treated as generic, and a conservative estimate of electroslag weld chemistry will be comprised of the mean of the data plus one standard deviation as described in Regulatory Guide 1.99 Revision 2 Section 1.1.

ComEd does not accept the application of 10 CFR 50.61 criteria to this evaluation, because the application of the Pressurized Thermal Shock Rule is inappropriate to boiling water reactors. However, the same criteria are found in Regulatory Guide 1.99 Revision 2 Section 1.1, which is appropriate for application to boiling water reactors. ComEd will revise General Electric report GE-NE-B11-00707-01R1, July 1996, to reflect the addition of one standard deviation to the electroslag weld chemistry mean values found in the adjusted reference temperature (ART) Tables.

3) If best-estimate chemistry is determined generically, explain the relationship between the information provided in Question 1 and the data used to determine the generic best-estimate chemistry values.

The response to Question 1 of the RAI provides the weld wire heat and welding procedure qualification "PQ" numbers that could have been used to fabricate the electroslag welds in the Dresden Unit 2 and 3 and Quad Cities Unit 1 and 2 reactor vessels. The chemistry data provided as part of the September 20, 1996 Submittal in reports BAW-2258, "Evaluation of RTndt, USE, and Chemical Composition of Core Region Electroslag Welds for Dresden Units 2 and 3," January 1996, and BAW-2259, "Evaluation of RTndt, USE, and Chemical Composition of Core Region Electroslag Welds for Quad Cities Units 1 and 2," January 1996, includes all the chemistry data for electroslag welding procedure qualifications (designated by "PQ" numbers) produced in the Babcock and Wilcox (B&W) shops for ComEd and non-ComEd vessels, using similar materials, similar electroslag welding procedures, and in the same time period. Chemical analyses of electroslag weld material from ComEd and non-ComEd metal surveillance capsules for B&W vessels produced using similar materials, similar electroslag welding procedures, and in the same time period are also included in the database provided in reports BAW-2258 and BAW-2259 which forms the basis for a conservative estimate of electroslag weld chemistry

4) Provide the neutron fluence (ID and 1/4T locations) for 22 EFPY. Also, provide the EFPY for each unit on January 1, 1997.

The 22 EFPY ID and 1/4T neutron fluences for the most limiting beltline material among the four Dresden and Quad Cities vessels are 3.51E+17 n/cm^2 and 2.43E+17 n/cm^2, respectively. The neutron fluences (ID and 1/4T) explicitly shown in the Submittal Tables are 32 EFPY values. A linear relationship exists between fluence and EFPY. Appropriate fluence values were used for the 18, 20, and 22 EFPY adjusted reference temperature Tables, but were not explicitly shown. The Tables for 18, 20, and 22 EFPY will be revised to show the predicted neutron fluence specific to the Table EFPY as well as the 32 EFPY fluence.

The estimated EFPY as of January 1, 1997 for each unit is as follows:

Dresden Unit 2: *15.03 EFPY*

Dresden Unit 3: *14.55 EFPY*

Quad Cities Unit 1: *15.79 EFPY*

Quad Cities Unit 2: *15.44 EFPY*

5) The following discrepancies exist when comparing the chemistry values in Tables C-1 through C-4 of the submittal to Attachment B of the Letter from M.A. Jackson (CECo) to T.E. Murley (USNRC), Subject: Dresden Station Units 2 and 3; Quad Cities Station Units 1 and 2; LaSalle County Station Units 1 and 2, July 1, 1992 (note: these discrepancies do not seem to result from updates due to any specific evaluations). For each of the following materials, provide the explanation for the chemistry values used in the submittal:

a) Dresden 2 Lower Shell Plate Heat A9128-2: the July 1, 1992, letter has Ni = 0.45, the current submittal has Ni = 0.55.

b) Dresden 2 Lower Shell Plate Heat B3990-2: the July 1, 1992, letter has Ni = 0.42, the current submittal has Ni = 0.51.

c) Dresden 2 Lower Shell Plate Heat A9128-1: the July 1, 1992, letter has Ni = 0.45, the current submittal has Ni = 0.55.

d) Dresden 2 Lower Int. Shell Plate Heat B4065-1: the July 1, 1992, letter has Ni = 0.52, the current submittal has Ni = 0.55.

e) Dresden 2 Lower Int. Shell Plate Heat B4030-1: the July 1, 1992, letter has Ni = 0.55, the current submittal has Ni = 0.59.

f) Dresden 2 Lower Int. Shell Plate Heat B4030-2: the July 1, 1992, letter has Ni = 0.55, the current submittal has Ni = 0.58.

g) Dresden 2 Lower Int. Shell Axial Welds Heat 1P0815: the July 1, 1992, letter has Cu = 0.12, the current submittal has Cu = 0.17.

h) Dresden 2 Lower Shell Axial Welds Heat 1P0815: the July 1, 1992, letter has Cu = 0.25 and Ni = 0.48, the current submittal has Cu = 0.17 and Ni = 0.52.

i) Dresden 2 a Lower Int./Lower Shell Circ. Weld Heat 71249: the July 1, 1992, letter has Cu = 0.21, the current submittal has Cu = 0.26.

j) Dresden 3 Lower Int./Lower Shell Circ. Welds Heat 299L44: the July 1, 1992, letter has Cu = 0.29 and Ni = 0.72, the current submittal has Cu = 0.35 and Ni = 0.68.

k) Quad Cities 1 Lower Int./Lower Shell Circ. Weld Heat 72445: the July 1, 1992, letter has Cu = 0.10, the current submittal has Cu = 0.21.

l) Quad Cities 1 Lower Int./Lower Shell Circ. Weld Heat 406L44: the July 1, 1992, letter has Cu = 0.22, the current submittal has Cu = 0.31.

The discrepancies in the chemistry values between Tables C-1 through C-4 of the September 20, 1996 Submittal and Attachment B of the July 1992 letter are explained as follows:

Items 5a) through 5f) refer to nickel analyses of plates in the Dresden 2 vessel. The values reported in the July 1,1992 letter were based on an extensive General Electric evaluation provided to ComEd in the mid 1980s, which provided a fabrication history summary of the Dresden and Quad Cities reactor vessel beltline materials. The nickel values reported in the July 1, 1992 letter were based on the General Electric evaluation, which utilized one, but not necessarily the most limiting, of the multiple chemical analyses shown on the B&W Certified Material Test Reports (CMTRs) for the applicable material. For the September 20, 1996 Submittal, the same CMTRs were re-evaluated by General Electric. Each CMTR provided a ladle analysis by Lukens (the plate manufacturer) and check analyses by B&W. For conservatism, the highest value of nickel apparent from the ladle or check analyses was used in the September 20, 1996 submittal, resulting in some values being increased. In addition, it has been verified that the only available value of nickel (from the Lukens heat ladle analysis) was used in the September 20, 1996 Submittal for Dresden Unit 3 and Quad Cities Units 1

and 2; check analyses were apparently performed by B&W only for the Dresden Unit 2 plates.

Items 5g) through 5l) refer to copper and nickel analyses for submerged arc axial and circumferential welds in the Dresden Unit 2 and 3 and Quad Cities Unit 1 vessels(it should be noted that the circumferential submerged arc weld in the beltline of the Quad Cities Unit 2 vessel is a Chicago Bridge & Iron weld for which there is no more recent data available) The values reported in the July 1, 1992 letter were obtained from an extensive General Electric evaluation provided to ComEd in the mid 1980s, which provided a fabrication history summary of the Dresden and Quad Cities reactor vessel beltline materials. Report BAW-2121P from April of 1991, which is referenced in the September 20, 1996 Submittal, was used for the September 20, 1996 Submittal because it is the most current review of available heat-specific data on the B&W submerged arc welds of the Dresden and Quad Cities reactor vessels. Report BAW-2121P is based on a larger database than the database that was available to General Electric in the mid 1980s time period.

6) It should be noted that Attachment B of the above mentioned July 1, 1992, letter from M.A. Jackson (CECo) to T.E. Murley (USNRC), uses the weld procedure qualification number (i.e., PQ2563) as the designator for the heat ID. For Quad Cities 1, the letter lists additional ESW welds that Table C-3 in the submittal does not show. In addition, the submittal does not associate heat IDs with the ESW welds for Dresden and Quad Cities. The additional beltline welds are identified as Lower and Lower Int. Axial Welds. Verify whether or not these welds exist in the Quad Cities 1 beltline. If they do exist, provide the information requested in Questions 1 and 2.

The fabrication of the Dresden Unit 2 and 3 and Quad Cities Unit 1 and 2 reactor vessels utilized the electroslag weld process for the lower-intermediate and lower shell courses. Appendix B of the July 1, 1992 letter provides the weld method (electroslag or submerged arc) used for each axial weld and the azimuthal locations of the welds in the shell courses. The above responses to Questions 1 and 2 apply to all of the electroslag welds in the lower-intermediate and lower shell courses in the Dresden and Quad Cities vessels. Specific weld metal heat numbers and properties are not known for specific Dresden and Quad Cities electroslag welds, and this was explained in a January 22, 1993 enforcement conference presentation to the NRC. The July 1, 1992 letter and reports BAW-2258 and BAW-2259 provided in the September 20, 1996 Submittal are consistent in that the number of electroslag and submerged arc welds shown in the lower-intermediate and lower shell courses is the same. The Tables for 18, 20, and 22 EFPY in the September 20, 1996 Submittal will be clarified to show separate line items for each of the lower-intermediate and lower shell courses, and the number of axial electroslag and submerged arc welds in each shell course.

7) Based on the response to the above questions, provide the adjusted reference temperature for the limiting materials in Dresden, Units 2 and 3, and Quad Cities, Units 1 and 2, at the expiration of the P-T limits. If responses to the above questions result in an adjusted reference temperature greater than that used in the P-T limits, provide revised P-T limits, or adjust the expiration of the proposed P-T limits accordingly.

The ART Tables for 18, 20, and 22 EFPY in the September 20, 1996 Submittal will be revised as described above. The ART of some of the individual vessel materials will increase. However, the pressure-temperature limits proposed in the September 20, 1996 Submittal are based on the most limiting material among the group of four vessels, and the ART for this most limiting material does not change. Therefore the pressure-temperature limits in the September 20, 1996 Submittal do not require revision or adjustment of EFPY applicability.

Table 6. D2/3 and Q1/2 Electroslag Weld Wire Heat and Flux Lot Numbers.

WELD MATERIAL QUALIFICATIONS
ELECTRO-SLAG (HI-MN-MO)

Wire Heat No.	Flux Lot #	Page	DRE 2	DRE 3	QUAD 1	QUAD 2	Notes
W8349	518		X				No Wire-Flux Tests made on shell seam as deposited weld materials. See Qualification Test Data referenced below for typical weld material chemical and physical properties.
34A167	3496		X	X			
36A168	3496			X	X		
37A344	3496			X			
0L0794	8467				X		
35A320	3496				X		
37C065	8445				X		
0L0636	Linde Flux 124					X	
0L0780	Linde Flux 124					X	
0L0794	Linde Flux 124					X	
120L40	Linde Flux 124					X	
34A167	Linde Flux 124					X	
35A320	Linde Flux 124					X	
36A168	Linde Flux 124					X	
37C257	Linde Flux 124					X	
37A334	Linde Flux 124					X	
37C065	Linde Flux 124					X	
Qualification Test	PQ-1092C-2	77/78	X				Electroslag Welding Report Dated September 5, 1969 Page 83 through 87
Qualification Test	PQ-1300	79/80		X	X	X	
Qualification Test	PQ-2563	81/82			X		